Planting prosopis seedlings in Sudan's Kerma Basin.

PHOTO: G. Lessard
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GROWING TREES IN SUDAN'S DESERTS

by CLYDE SANGER

A dozen men in the sands of the Kerma Basin in northern Sudan have had a message of hope for the people who took part in the United Nations Conference on Desertification (UNCOD) held in Nairobi in August-September.

The purpose of UNCOD, as the conference's first brochure proclaimed, was "not to give rise to further discussion, but to generate action". And Hassan Musnad and his small group of workers -- pump attendants, meteorological readers and labourers -- are well into a third year of vigorous action to show how large areas of what is now desert can be reclaimed for agriculture.

The Kerma Basin was far from desert 40 years ago. In those days the river Nile meandered across the plains of northern Sudan and, during the flood season, filled many depressions or basins with rich alluvial soils. Farmers took good crops from them while the groundwater remained. The Kerma Basin, covering an area of some 1500 sq kilometres, offered good harvests even though the rainfall is less than 75mm a year.

Then, beginning in the 1930s, the pattern altered as people built dams on the tributaries that fed the Nile and the great river flooded less and less. The alluvial soils that lay in the basins were covered by sand blowing in from the Nubian desert, and no new soil was deposited in them from the Nile.

These areas became desert themselves. They added to a general, terrifying statistic about the whole of that enormous country: that one-third of the irrigable land in the Sudan is lost every 10 years by the

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desert creeping forward in different ways.

About 20 years ago the Sudan Government tried to reclaim land in these basins for farming by drilling wells at various points. Farmers were persuaded to return for a time, and were pleased to find water flowing along irrigation ditches. But they soon left when they found that their first crops were damaged by desiccating winds, and when their fields and the irrigation furrows were covered by blowing sand.

A second attempt at reclamation began in 1974, with support from the International Development Research Centre. This time it took the form of planting lines of quick-growing and hardy trees to protect the land that might be farmed from wind and sand.

Shelterbelts (whether or not they were called by such a scientific name) have been planted by farmers for centuries. Scientific principles, including aerodynamics, began to be applied to them in places like the great plains of the United States and the Soviet Union at about the time the Kerma Basin was turning into desert. Experiments, however, in any part of Africa south of the Sahara began only recently.

In the Kerma Basin they have planted more than 30 belts of trees, each belt some 210 metres in length, near to two of the wells. After two years the survival rate of young trees has been encouragingly high: over 90 percent in every case, and in most cases 100 percent of them, have survived.

Hassan Musnad, head of forestry research in arid zones for the Forest Research Institute in Khartoum, is seeking answers to several questions. What is, for example, the best species for these conditions? Eucalyptus camuldunensis has grown well, but Prosopis chilensis has some special advantages in that it produces pods that are rich in protein and sugar and yet animals don't damage this tree in its early years by browsing. But will either species survive when the shelterbelts are no longer being directly irrigated, but instead rely on water seeping off the fields or on their roots reaching the water-table 15 metres down?

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Again, what sort of networks of shelterbelts create the best conditions for farming there? Some of the belts consist of only two lines of trees, some have as many as five. Some of them have been planted as "outer walls" or screens, to take the first shock of the winds and sand, and others as internal lines to create a favorable microclimate within the area and reduce evaporation. But planting too many trees is a danger, too: they can deprive the food crops of water and soil. How many is enough?

A large number of scientific instruments surround the shelterbelts. Anemometers on poles of differing heights record the wind-force. Earth thermometers and evaporimeters keep note of how the trees are affecting the temperature. An ingenious device -- a windvane with pipe and bag attached -- has been introduced by Mr Musnad to trap blowing sand at various points and thus measure to what extent the shelterbelts are affecting the volume of sand in the air.

The project has reached the stage where agronomists can begin experimenting on the best crops to be grown under irrigated and rainfed conditions. Millet does well, to be sure; but what about various vegetables, for example tomatoes?

Not only scientists are showing interest in the Kerma Basin project. Farmers have come out from Dongola, 40 kilometres away, to find out how effective these new shelterbelts may prove to be. And large companies interested in big-scale farming have also made inquiries.

This project in the Sudan is only one among a dozen forestry projects in the arid and semi-arid zones of Africa that the IDRC has been supporting in the hopes that some of them will show the way to better means of reclaiming or protecting good land from the desert, or else to a solution of the growing problem of a shortage of fuelwood.

In northern Nigeria, for example, the work is on rain-fed land -- to identify suitable species in those conditions to act as windbreaks for farmland. In Mali a team is refining methods of irrigation for plantations that will serve both as windbreaks and (eventually) as fuelwood. In Egypt the main thrust of research is upon breeding an improved type of casuarina

for shelterbelts. In Kenya, where many plantations were established in areas of high rainfall and are now being felled for farmland, foresters are trying to discover which species will grow best on marginal land.

To make sure these teams can learn from each other's experience, IDRC is supporting for an initial four years a team of travelling advisers, headed by Gunnar Poulsen of Denmark who has worked many years in Africa. The team is visiting each project regularly, carrying news from the others. It is also arranging exchange visits, such as the one Mr Musnad paid to Mali. This sort of work is one response to UNCOD's call to action.

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